Space Weather Forecast

Issued on Sunday, 17 March 2024 at 13:16 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Recent Minor Solar Radiation Storm declining. Oncoming sunspot regions bringing a chance of moderate flares. Slight chance of glancing CME (coronal mass ejection) influences. Potential for an Earth-directed CME to arrive late in the period - pending analysis.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity increased to moderate following an moderate flare at 16/1635 UTC from a region currently yet to round the southeast limb, with a further moderate flare recorded from the same region at 16/2155UTC, this in contrast to previous background X-ray activity near the common-class boundary. The current visible disc comprises four numbered sunspot groups and two unnumbered, with all of these magnetically simple. The main growth trend was seen in AR3613 in the south-centre disk, which continued to see spreading, proliferation of spots and areal growth during the period. Further growth and spread was also seen in the new unnumbered region near centre-disc north. There is now a large sunspot emerging around the northeast limb, which is currently unnumbered, although this is difficult to analyse at this stage due to its proximity to the limb.

The main event to note during the past 24 hours was a large filament lift-off (arc of plasma) near the south-centre disc around 17/0230UTC, which occurred just south of AR3613. This produced a Coronal Mass Ejection (CME), which is currently under-going analysis. Dimming was evident from this event in coronagraph imagery. Given its location, this could be a potential Earth-directed CME, with a possible (estimated) arrival sometime either late on 19th or early 20th March - pending results.

Solar Wind / Geomagnetic Activity: Solar wind speeds showed a slowly declining trend from 400km/s to-350km/s at present. The interplanetary magnetic field (IMF) was weak throughout, with the important north-south component generally weakly positive. The net result of the above solar wind measures was for provisionally Quiet geomagnetic activity throughout.

Energetic Particles / Solar Radiation: Solar radiation levels showed an initial enhancement above S1 levels in the wake of the 15/0610UTC flare from Ex-AR3599 around the western limb. This level was first breached from 15/2050UTC and reached a maximum of 17pfu at 16/0635UTC. Values subsequently declining, falling below S1 levels by 16/1600UTC and continuing to decline towards current slightly elevated levels.

Four-Day Space Weather Forecast Summary

Solar Activity: Low to moderate solar activity expected with ongoing common class activity and a rising chance of further isolated moderate class activity, this looking to be largely as a result of the approaching regions due over the eastern solar horizon later in the current UTC weekend.

Solar Wind / Geomagnetic Activity: There are up to three glancing incidence CME shocks

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expected to pass the radius of Earth's orbit through days 1-3 (17-19 Mar). In the absence of significant CME activity solar winds are expected to remain at generally background to slightly elevated levels with any fast wind enhancements expected to be relatively minor in the period. Mostly Quiet or Unsettled (Kp 0-3) conditions are expected, with a chance of Active (Kp 4) intervals and a slight chance of an isolated G1/Minor Storm (Kp 5) interval on days 1-3 (17-19 Mar) given the potential for glancing CME influence. Potential for a more Earth-directed CME from the aforementioned filament lift-off observed at 17/0230 UTC - pending results.

Energetic Particles / Solar Radiation: Solar radiation levels have fallen below S1 levels as the response to the recent flare continues to decline. A regression to a background risk for further S1 storms is expected into the new UTC working week given the apparently magnetically simple sunspot regions facing Earth at present.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	10	10	10
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	20	30	30	30
Very Active	R3 to R5 X	No	5	5	5	5

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Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	Yes	10	1	1	1
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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